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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/971,721	10/04/2001	Otto Lenherr	4780-19	3049

7590 11/14/2006

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EXAMINER	
STAICOVICI, STEFAN	
ART UNIT	**PAPER NUMBER**
1732	

DATE MAILED: 11/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/971,721	Applicant(s) LENHERR, OTTO
	Examiner Stefan Staicovici	Art Unit 1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *26,31-50,52-67 and 69-86* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *26, 31-50, 52-67, 69-86* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 12, 2006 has been entered.

Response to Amendment

2. Applicants' amendment filed August 4, 2006 has been entered. Claims 26, 31-50, 52-67, 69-86 are pending in the instant application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 26, 31-37, 45-48, 52-54, 63-67, 69-74 and 82-85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817.

Johnson ('251) teaches the basic claimed process of molding a hollow fiber composite structure having a hollow undercut including, wrapping a wax core with fiber material to form a wrapped assembly, placing said wrapped assembly into a mold cavity, injecting a resin into said

mold cavity to impregnate said fiber material, curing (hardening) said resin to form a hardened structure and melting out said wax core to form said hollow fiber composite structure (see col. 6, lines 34-62 and, col. 8, lines 17-24 and 43-47). Further, Johnson ('251) specifically teaches removing the wax core after curing by melting said core, hence teaching that the melting temperature of the wax core is higher than the injection/curing temperature of the resin because if the melting temperature were lower, than the core would melt/deform prior to curing which is in contradiction to the specific teachings of Johnson ('251) (see col. 8, lines 14-25). Hence, it is submitted that when using a wax core in the molding of a fiber reinforced component the deformation temperature of the core must be at least equal to or higher than the injection temperature of the resin matrix in order that said core maintain its geometric integrity. If the deformation temperature is lower, then the core will loose its geometrical integrity and as such could not be used during the molding process to form said fiber reinforced component.

Regarding claims 26, 31-37, 67 and 69-74, although Johnson ('251) teaches forming a wax core having a desired configuration, Johnson ('251) does not teach forming said wax core by plastic deformation of a cast wax preform at a temperature less than the melting temperature of the wax. JP 61-016817 teaches forming a paraffin wax (natural wax) article by compression molding (plastic deformation) of a solid core wax preform (15) at a temperature of 40-80% of the melting temperature of 63 ^{O}C, which is calculated to be 25.2-50.4 ^{O}C. It is submitted that a solid core wax preform must have been previously cast in order to be a solid core wax preform. Therefore, it would have been obvious for one of ordinary skill in the art to have used compression molding (plastic deformation) of a solid core paraffin wax preform (natural wax) at a temperature of 25.2-50.4 ^{O}C as taught by JP 61-016817 to form the wax core in the process of

Johnson ('251) because, JP 61-016817 teaches that compression molding provides for an improved product by avoiding shrinkage and also because, Johnson ('251) specifically teaches forming a solid wax core having a desired configuration, hence requiring the teachings of JP 61-016817 to function as described.

Further regarding claims 26, 31-37, 67 and 69-74 and in regard to claims 52-54, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite (see col. 8, line 15-25). JP 61-016817 teaches that the melting temperature of the wax is 63 ^{O}C. Therefore, it is submitted that the heating temperature of the wax core during the resin injection step must within the melting range of the wax core and as such must be about 63 ^{O}C (±6 ^{O}C). Further, it is submitted that the actual temperature is a result-effective variable because, if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, hence resulting in a defective product. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). It is submitted that such a calculation is in the realm of one ordinarily skilled. Therefore, it would have been obvious for one of ordinary skill in the art to have used routine experimentation to determine an optimum heating temperature (±6 ^{O}C) in the process of Johnson ('251) in view of JP 61-016817 because, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite, hence teaching that if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, as such teaching that the heating temperature is a result-effective variable.

In regard to claims 45-48 and 82-85, JP 61-016817 teaches a two-part compression mold in which the top and bottom molds are brought together to mold said wax core (see Figures) from a preform. Therefore, it would have been obvious for one of ordinary skill in the art to have used a two-part compression mold for compression molding (plastic deformation) of a wax preform as taught by JP 61-016817 to form the solid wax core in the process of Johnson ('251) because, JP 61-016817 teaches that compression molding provides for an improved product by avoiding shrinkage and also because, Johnson ('251) teaches forming a wax core having a desired configuration.

Regarding claims 63-66, Johnson ('251) teaches glass fibers and epoxy resin (col. 8, lines 64-67 and col. 9, lines 13-18). It is submitted that an epoxy resin cures at about 80°C and is injected at about 60°C in order to avoid premature curing. Further, JP 61-016817 teach a melting temperature of about 63°C, hence requiring such a heating temperature to remove the core from the molded product obtained by the process of Johnson ('251) in view of JP 61-016817.

5. Claims 38-44 and 75-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Vandas (US Patent No. 4,246,884).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claims 38-44 and 75-81, although Johnson ('251) in view of JP 61-016817 teaches a wax material, Johnson ('251) in view of JP 61-016817 do not teach a wax material having a melting temperature of at least 75, 85 or 90 °C and at most 110, 120 or 130 °C. Vandas ('884) teaches forming a wax article by compression molding (plastic deformation) a core mass

(see col. 7, lines 2-10 and 20-30), wherein said wax material has a melting temperature of less than 215 °F (115 °C). Therefore, it would have been obvious for one of ordinary skill in the art to have used the wax material of Vandas ('884) to mold the wax core in the resin transfer molding process of Johnson ('251) in view of JP 61-016817 because of known advantages that a higher melting temperature core provides in a resin transfer molding process such as the ability to use a higher temperature curing resin, thereby providing for an improved product having a higher resistance to temperature stresses.

6. Claims 49 and 86 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of JP 07-314477.

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claims 49 and 86, Johnson ('251) in view of JP 61-016817 does not teach a resin trap channel to remove excess resin and gas. However, the use of trap channels to remove excess resin and gas in a molding process are well known as evidenced by JP 07-314477 which teaches the use of a trap channel (4) connected to a pin hole (3) and to mold cavity (2) (see Figure). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a trap channel as taught by JP 07-314477 in the process of Johnson ('251) in view of JP 61-016817 because, JP 07-314477 specifically teaches that trap channels avoids the formation of flash, hence improving product aesthetics.

7. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Holtzberg (US Patent No. 6,344160 B1).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claim 50, although Johnson ('251) teaches melting of the wax core, Johnson ('251) in view of JP 61-016817 does not teach reusing the molten wax to make another, new preform core. Holtzberg ('160) teaches a lost wax core process including recycling the molten wax to form new cores (see col. 16, lines 59-61). Therefore, it would have been obvious for one of ordinary skill in the art to have recycled the molten wax as taught by Holtzberg ('160) in the process of Johnson ('251) in view of JP 61-016817 due to a variety of known advantages that recycling provides such as reduced costs, reduced waste, etc.

8. Claim 55-59 rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Jones ('116).

Johnson ('251) in view of JP 61-016817 teaches the basic claimed process as described above.

Regarding claim 55, although Johnson ('251) in view of JP 61-016817 teaches heating a wax core, Johnson ('251) in view of JP 61-016817 does not specifically teach that said wax core expands. Jones ('116) teaches a molding process for making a hollow fiber composite structure including, providing a wax core, wrapping said wax core with resin impregnated fiber to form a wrapped assembly, heating said wrapped assembly such that said core expands and applies pressure onto said fiber and melting said core to form said hollow fiber composite structure (see col. 2, lines 55-61 and col. 3, lines 14-39). It is submitted that expansion occurs by more than 0%. Therefore, it would have been obvious for one of ordinary skill in the art to have allowed the wax core to expand as taught by Jones ('116) in the process of Johnson ('251) in view of JP 61-

016817 because, Jones ('116) teaches that such expansion provides a pressure onto the fiber layer that removes excess resin, hence providing for an improved molded article.

Further in regard to claim 55 and in regard to claims 56-59, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite (see col. 8, line 15-25). Further, Jones ('116) teaches heating said wrapped assembly such that said core expands and applies pressure onto said fiber and melting said core to form said hollow fiber composite structure (see col. 2, lines 55-61 and col. 3, lines 14-39). JP 61-016817 teaches that the melting temperature of the wax is 63 ^{O}C. Therefore, it is submitted that the heating temperature of the wax core during the resin injection step must within the melting range of the wax core and as such must be about 63 ^{O}C. Further, it is submitted that the actual temperature is a result-effective variable because, if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then expansion and curing will not occur, hence resulting in a defective product. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Therefore, it would have been obvious for one of ordinary skill in the art to have used routine experimentation to determine an optimum heating temperature in the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) because, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite, hence teaching that if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then expansion and curing will not occur, and as such teaching that the heating temperature is a result-effective variable.

9. Claims 60-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (US Patent No. 5,045,251) in view of JP 61-016817 and in further view of Jones ('116) and Daskivich (US Patent No. 3,811,903).

Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) teaches the basic claimed process as described above.

Regarding claims 60-62, although Jones ('116) teaches thermal expansion of a wax core material, Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) do not teach a specific volumetric expansion. However, it is well known that materials used in a lost core process expand within the range of 1-5% as evidenced by Daskivich ('903) which teaches a specific wax based material used in a lost core molding process having a volumetric expansion of less than 5% when heated from 70-220°F (see col. 3, lines 19-40). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a wax material having a volumetric expansion of less than 5% when heated from 70-220°F as taught by Daskivich ('903) in the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) because, Daskivich ('903) specifically teaches that wax based material that is used in a lost core molding process has a volumetric expansion of less than 5% when heated from 70-220°F, whereas the process of Johnson ('251) in view of JP 61-016817 and in further view of Jones ('116) requires a wax material that is heated within the range of 185-240°F to function as described and also because of its well known status as evidenced by Daskivich ('903).

10. Claims 67, 69-74 and 82-85 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-016817 in view of Johnson (US Patent No. 5,045,251.

JP 61-016817 teaches the basic claimed process for making a wax article by compression molding (plastic deformation) a core wax preform (15). Further, it is noted that the limitation of a "for use in...a resin transfer molding process" is a pure functional limitation and does not carry patentable weight. Furthermore, it is noted that in a claim drawn to a process of making, recitation of the intended use of the claimed wax core must result in a structural difference between the claimed process and the prior art in order to patentably distinguish the claimed invention from the prior art.

Regarding claim 67, JP 61-016817 does not teach that the temperature of the core during plastic deformation is at least the injection temperature of the resin during production of a fiber reinforced component. It is noted that it is well known that when using a wax core in the molding of a fiber reinforced component the deformation temperature of the core must be at least equal to or higher than the injection temperature of the resin matrix in order that said core maintain its geometric integrity and perform its molding function. If the deformation temperature is lower, then the core will loose its geometrical integrity and as such could not be used during the molding process. Johnson ('251) teaches a process of molding a hollow fiber composite structure having a hollow undercut including, wrapping a wax core with fiber material to form a wrapped assembly, placing said wrapped assembly into a mold cavity, injecting a resin into said mold cavity to impregnate said fiber material, curing (hardening) said resin to form a hardened structure and melting out said wax core to form said hollow fiber composite structure (see col. 6, lines 34-62 and, col. 8, lines 17-24 and 43-47). Further, Johnson ('251) specifically teaches removing the wax core after curing of said resin by melting said core, hence teaching that the melting temperature of the wax core is higher than the injection/curing temperature of the resin

because if the melting temperature of said core were lower, than said core would melt/deform prior to curing which is in contradiction to the specific teachings of Johnson ('251) (see col. 8, lines 14-25). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a wax material having a deformation (melting) temperature during plastic deformation at least equal to the injection temperature of a resin during production of a fiber reinforced component as taught by Johnson ('251) for making the wax core by the process of JP 61-016817 because Johnson ('251) specifically teaches removing the wax core after curing by melting said core, hence providing for an improved process by allowing an efficient removal of the core in subsequent processing using said core.

Further regarding claim 67, as shown above, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite (see col. 8, line 15-25). JP 61-016817 teaches that the melting temperature of the wax is 63 ^{O}C. Therefore, it is submitted that the heating temperature of the wax core during the resin injection step must be within the melting range of the wax core and as such must be about 63 ^{O}C (±6 ^{O}C). Further, it is submitted that the actual temperature is a result-effective variable because, if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, hence resulting in a defective product. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). It is submitted that such a calculation is in the realm of one ordinarily skilled. Therefore, it would have been obvious for one of ordinary skill in the art to have used routine experimentation to determine an optimum heating temperature (±6 ^{O}C) in the process of JP 61-016817 in view of Johnson ('251) because, Johnson ('251) teaches melting of the wax material from the resulting fiber reinforced composite, hence

teaching that if the heating temperature of the wax core during the resin injection step is too high then the wax core will melt prior to curing of the resin and if it's too low then curing will not occur, as such suggesting that the heating temperature is a result-effective variable.

In regard to claims 69-71, JP 61-016817 teaches compression molding (press-molding) at a temperature of 40-80% of the melting point of the wax, which is 63 °C.

Specifically regarding claims 72-74, JP 61-016817 teaches a paraffin wax.

Regarding claims 82-85, JP 61-016817 teaches a two-part compression mold in which the top and bottom molds are brought together to mold said wax core (see Figures) from a preform.

11. Claims 75-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-016817 in view of Johnson (US Patent No. 5,045,251) and in further view of Vandas (US Patent No. 4,246,884).

JP 61-016817 in view of Johnson ('251) teaches the basic claimed process as described above.

Regarding claims 75-81, although JP 61-016817 in view of Johnson ('251) teaches a wax material, JP 61-016817 in view of Johnson ('251) does not teach a wax material having a melting temperature of at least 75, 85 or 90 °C and at most 110, 120 or 130 °C. Vandas ('884) teaches forming a wax article by compression molding (plastic deformation) a core mass (see col. 7, lines 2-10 and 20-30), wherein said wax material has a melting temperature of less than 215 °F (115 °C). Therefore, it would have been obvious for one of ordinary skill in the art to have used the wax material of Vandas ('884) to mold the wax core by the molding process of JP 61-016817 in view of Johnson ('251) because of known advantages that a higher melting temperature

material provides such as the ability to withstand a higher temperature stress, hence providing for an improved product.

12. Claim 86 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 61-016817 in view of Johnson (US Patent No. 5,045,251) and in further view of JP 07-314477.

JP 61-016817 in view of Johnson ('251) teaches the basic claimed process as described above.

Regarding claim 86, JP 61-016817 in view of Johnson ('251) does not teach a resin trap channel to remove excess resin and gas. However, the use of trap channels to remove excess resin and gas in a molding process are well known as evidenced by JP 07-314477 which teaches the use of a trap channel (4) connected to a pin hole (3) and to mold cavity (2) (see Figure). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a trap channel as taught by JP 07-314477 in the process of JP 61-016817 in view of Johnson ('251) because, JP 07-314477 specifically teaches that trap channels avoids the formation of flash, hence improving product aesthetics.

Response to Arguments

13. Applicants' remarks filed April 17, 2006 have been considered but have been fully answered in the Advisory Action mailed May 10, 2006.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stefan Staicovici, Ph.D. whose telephone number is (571) 272-1208. The examiner can normally be reached on Monday-Friday 9:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson, can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stefan Staicovici, PhD
Stefan Staicovici 11/12/06
Primary Examiner

AU 1732

November 10, 2006